Interagency Ecological Program for the Sacramento-San Joaquin Estuary

Newsletter

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For information on the Interagency Ecological Program, visit our home page on the World Wide Web (www.iep.water.ca.gov).

Readers are encouraged to submit brief articles or ideas for articles. Correspondence, including requests for changes in the mailing list, should be addressed to Randall Brown, California Department of Water Resources, 3251 S Street, Sacramento, CA 95816-7017.

Interagency Program Quarterly Highlights

1997 Fall Dissolved Oxygen Conditions in the Stockton Ship Channel

Stephen P. Hayes and Jeannie S. Lee

Dissolved oxygen concentrations in the Stockton Ship Channel are closely monitored by staff of DWR's Bay-Delta Monitoring and Analysis Section during the late summer and early fall each year. Monitoring is conducted because D.O. levels can drop below 5.0 mg/L in the eastern channel due to low stream inflows, warm water temperatures, high biological oxygen demand, reduced tidal circulation, and intermittent reverse flow conditions in the San Joaquin River past Stockton. These low dissolved oxygen levels can cause physiological stress to fish and block upstream migration of salmon. A barrier is usually installed at the head of Old River during periods of projected low fall outflow to increase net flows down the San Joaquin River past Stockton. The barrier was not installed in fall 1997, a wet year, because of high fall flows in the San Joaquin River.

Surface and bottom D.O. levels in the Stockton Ship Channel were obtained on eight monitoring runs conducted from August 4, 1997, to November 17, 1997. Monitoring from August through October 1997 showed a distinct surface and bottom dissolved oxygen sag in the eastern end of the ship channel with the lowest values (5.0 mg/L or less) in and immediately west of the Rough and Ready Island area. High water temperatures and low flow conditions appear to have contributed to the low D.O. conditions in the eastern channel. Water temperatures ranged from 25-27°C in August, 23-26°C in September, and 16-24°C in October. Average daily flows in the San Joaquin River past Stockton ranged from -466 cfs to +198 cfs in August, -329 cfs to +117 cfs in September, and -233 cfs to +439 cfs in October.

Dissolved oxygen conditions gradu-

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ally improved in November as a result of cooler water temperatures and improved flow conditions in the San Joaquin River. On November 3, all D.O. levels exceeded 5.0 mg/L, although a D.O. sag was still present. By November 17, all levels had improved to 5.8 mg/L or greater and the D.O. sag had been eliminated. This improvement was apparently due to cooler water temperatures (14-18°C) and the elimination of reverse flows past Stockton. Average daily flows past Stockton through mid-November ranged from +5 cfs to +189 cfs. The lack of late fall rainfall in the San Joaquin River drainage appears to have delayed the full recovery of D.O. levels in the channel to historical levels for November.

Modeling Teams Review & Plan Southern Delta Dye Studies

Chris Enright

The Delta Model PWT met in joint session with the Particle Tracking PWT to hear presentations by Rick Oltmann of USGS on the spring 1997 Dye Study, and Mark Pierce on the concurrent release of CWT salmon smolts. The data sets generated by these studies are valuable for calibrating and verifying Delta hydrodynamics, water quality, and particle tracking models. To the extent that the difference between dye and smolt movement indicates smolt behavior, the efficacy of using models to plan project response to the presence of out-migrating salmon can also be assessed.

Several members of the PWT will be attending the BDMF DSM2 workshop in February. Some members are also planning to assist the USGS with another dye study this spring which is intended, in part, to help identify salmon migration pathways compared to flow splits at distributaries, and the effect of pulse flows. The resulting data will also support planned calibration and verification work by the PWT this year.

Fall Neomysis/Zooplankton Distribution

Jim Orsi

No *Neomysis* were caught during fall, but *Acanthomysis bowmani* was abundant in the Suisun Marsh sloughs, in the entrapment zone, and in the Sacramento River at Decker Island. Most remarkable was a high catch of *A. bowmani* in the San Joaquin River at Stockton in October. It had not been caught this far upstream before.

As usual in fall, the most numerous copepod in Suisun Bay and the western delta was *Limnoithona tetraspina*. The second most abundant copepod in the delta was *Pseudodiaptomus forbesi*, and the second most abundant in Suisun Bay was *Acartiella sinensis*. *Sinocalanus doerrii* was rare as was *Acartia*. The predatory *Tortanus dextrilobatus* was fairly abundant in western Suisun Bay in October. *Eurytemora* reappeared in Montezuma Slough during October and at another geographical extreme in Disappointment Slough during November. Abundance patterns in time and space of the various native and exotic copepods have become predictable.

The cladocerans, *Bosmina* and *Daphnia*, were rare except in Disappointment Slough and in the San Joaquin River at Stockton. Rotifers were moderately abundant at some stations but were often not collected.

Substantial Increase in Mitten Crabs Collected at Tracy Fish Collection Facility in 1997

Scott Siegfried

The Chinese mitten crab (*Eriocheir sinensis*) first appeared in the south Delta in fall 1996, when they were collected at the Federal Tracy Fish Collection Facility (TFCF) in 10—minute subsamples. These catadromous (migrate from freshwater rearing areas to saltwater breeding areas) crabs are comprised of two migratory groups, with adults outmigrating to San Francisco Bay in fall and juveniles immigrating upstream in summer. TFCF collection numbers indicate an exponential population increase in their first year of occupation in the south Delta. Only nine mitten crabs, all adults (50-81mm carapace width, CW), were collected when they first appeared September 25 through October 26, 1996. Mitten crabs did not appear again at the TFCF until June 20, 1997, after which 44 crabs (mostly juveniles, 12-24mm CW) were collected through late August.

By September 1997, outmigrating adults again comprised the majority of mitten crabs collected, and in considerably higher numbers and over a longer period than in 1996. Between September-December 1997, more than 1,400 mitten crabs were collected. As many as 16,800 crabs may have been entrained to the TFCF over this period, based on an expansion factor of 12 times, as subsamples are collected for 10 minutes out of every 2 hours.

Mitten crabs continued to be collected after January 1, 1998. The exponential increase in their numbers in the south Delta since their first appearance is consistent with other introduced mitten crab population explosions around the world. Studies indicate a large population already exists in south San Francisco Bay. It is likely that we can expect an even more dramatic increase in numbers of mitten crabs at the TFCF and throughout the south Delta in 1998 and future years.

Juvenile Salmonid Monitoring Program

Erin Sauls

Sacramento Kodiak trawling began for the season on October 28. Twenty-one late-fall run, 13 fall run, 18 winter run and 25 spring run (based on size criteria) had been captured through the end of December. Fewer juvenile salmon were captured this time than were captured during this quarter last year. We anticipated capturing many juvenile winter run sized chinook in the delta this fall because of the large numbers that were seen in DFG and USFWS upriver monitoring beginning in late summer. Our first winter run capture occurred November 18 in the Princeton beach seine (RM163). First detection of winter run at Sacramento (trawl) occurred on November 24, and the Delta Cross Channel has been closed since November 25. The total delta (at Sacramento and downstream) winter run catch through December reached 79 (trawling and beach seine combined).

Winter run sized chinook were first detected leaving the Delta at Chipps Island December 7. Incidental delta smelt captures started to climb in early December, but have not limited sampling (ESA restrictions).

An experiment is under way that is designed to evaluate the potential effect of state and federal project exports on late-fall (and thus winter and yearling spring run) survival through the central delta. Paired releases will occur in December and January, at Ryde and Georgiana Slough, with the hypothesis that higher export levels (December condition) will have a greater impact on the survival of the Georgiana Slough groups relative to the Ryde groups. Combined exports have remained relatively high through December, but are scheduled to be reduced to 4,000 cfs for the January portion of the experiment. The Delta Cross Channel will be closed for both test periods. Paired releases make a stronger experiment in that they eliminate background variation due to changes in trawl efficiency as the two simultaneous releases are compared to each other. The preliminary results from the December release show no Georgiana Slough fish recovered at Chipps Island, versus 21 Ryde fish. Survival indices will be calculated when all the results are in. A combined total of 13 and 2, respectively, of Georgiana Slough fish and Ryde fish have been recovered at the CVP and SWP. A control group was released at Port Chicago (December 29) for later verification via ocean recoveries.

Delta Smelt Studies Program

Dale Sweetnam

The Fall Midwater Trawl Survey was completed on December 18. A total of 176 delta smelt was collected, which resulted in a December index of 161. This sets the 1997 annual index at 363. This is up from the 1996 index of 128, with December making up 45% of the index. However, the 1997 index is not as high as recent "odd" numbered years in the 1990s (e.g., 1991, 1993, 1995) in which the index ranged from 689 to 1,079.

The December distribution was centered in Suisun Bay and western Montezuma Slough. This distribution is distinctively different than what was observed from September through November where distribution was concentrated in the lower Sacramento River. The change in distribution is probably due to the change in outflow resulting from storms in early December and late November.

Abundance and distributional recovery criteria set forth in the USFWS' Delta Native Fishes Recovery Plan were not achieved in 1997. Therefore, the 5 year recovery period which spans five generations (most delta smelt only live one year) will be restarted in 1998.

Splittail Investigations

Randy Baxter

The IEP approved the proposal to radio tag and track adult splittail to their spawning grounds and the first implementation steps have begun. A site on the Sacramento River near Hood was chosen for a small culture facility to hold fish and study the effects of tagging on behavior and survival. Plans for the facility were drawn and a permit requested. Construction should occur in January. Tagging and tracking are scheduled to commence by late January.

Delta Fish Facilities Salvage Monitoring Program

Jerry Morinaka

The John E. Skinner Delta Fish Protective Facility, in Byron, recently experienced the results of warmer ocean temperatures caused by El Niño. Twelve small juvenile striped mullets were salvaged at the facility during a 10-day period in the middle of December. The striped mullet is a native fish of California, and in fresh water, is typically restricted to the lower Colorado River and southern coastal streams. This particular species is also known to be our only catadromous fish. The extent of the northern range for this species along the California coast is typically up to Monterey, and rarely up to San Francisco Bay. Only one other occurrence of striped mullet has been recorded at either the state or the federal Tracy Fish Collection Facility in the past, and that was at the state facility in 1977.